THE MAIN CAUSES OF CORROSION IN METALS, STATICS AND DYNAMICS OF THE CUTTING PROCESS

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Metalllardagi korroziyaning asosiy sabablari, kesish jarayonining statikasi va dinamikasi.

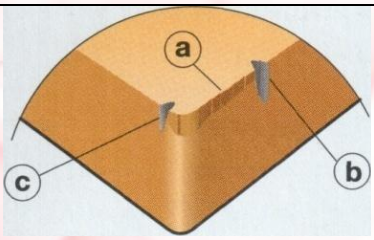
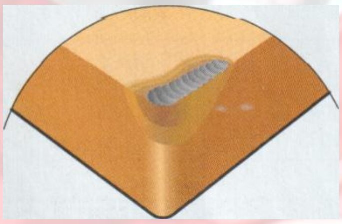
Маъмуров Э.Т., Хомидов Ж.С., Корабоев Э.В Основные причины коррозии металлов, статика и динамика процесса резания.

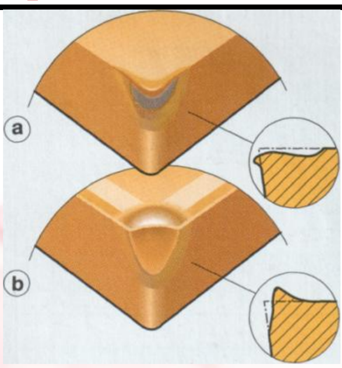
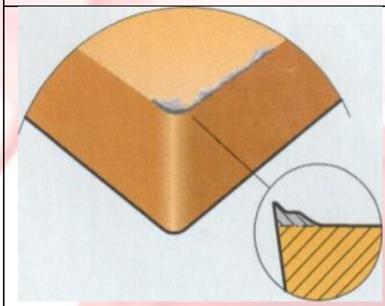
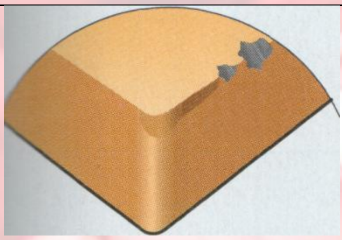
Ma'murov E.T, Xomidov J.S., Koraboev E.V The main causes of corrosion in metals, statics and dynamics of the cutting process.

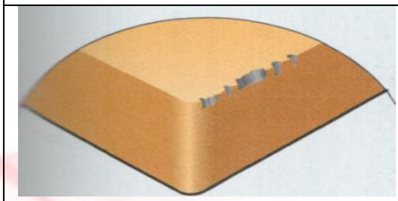
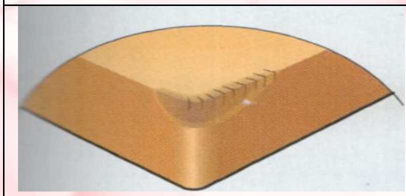
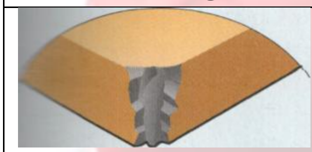
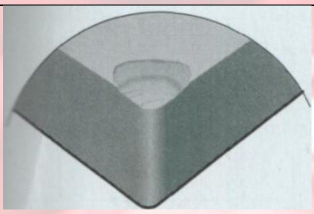
Abstract:
Cutting forces and power Cutting forces affect the machine tool-fixture-tool-part system. However, the determine the cutting temperature, cutting tool durability, machining accuracy, labor productivity, and required power. The material resists the penetration of the cutting tool and the separation of chips from the workpiece during cutting. The sum of the resistance forces is called the "cutting forces". The sources of resistance to the cutting motion of the cutting edge are: a) the resistance of the workpiece to plastic deformation of the material being cut; b) the resistance of the plastically deformed metal to deformation during the formation of new surfaces; d) the resistance of the resulting workpiece to additional bending and fracture; e) the friction forces on the cutting edge and other rubbing surfaces

Key words: Material, machine, tool, transmissions, vibration, erosion, corrosion, quality, surface, deformation.

According to the scientific research vibrations occur under the influence of periodic forces during operation. They occur under the following conditions: - when the cutting process is interrupted due to periodic changes in the cutting force; the machine tool, workpiece, tool and workpiece parts are not aligned (unbalanced). In this case, vibrations occur as a result of changes in the direction of action of centrifugal forces; - defects in machine tool transmissions, wear of gears and errors in the shape of teeth; shocks of the working fluid in the hydraulic system, etc. Forces cause the spindle or parts to vibrate; - when machining workpieces with non-circular cross-sections; deformation and stiffness change periodically. The vibration of other machines and machines passes, if they are working nearby and vibrate. The effect of these vibrations is even greater if the frequency of their vibrations coincides with the frequency of the machine tool - tool - fixture system; the two combine to create a "resonance". Since the sources of forced vibrations are known, it is easy to eliminate them. It is necessary to maintain the vibration of the machines at a normal level, ensure that their value is uniform, carry out the cutting process smoothly, etc. In automotive vibrations (spontaneous vibration), this issue is a problem, since there are no obvious external causes. Depending on the cutting conditions, wear occurs on different surfaces of the cutters. Using the example of a different shape, we will consider the wear that occurs on surfaces common to all types of cutters.

	erosions on the lateral surface	Causes of erosion on the side surface
  	Side surface: rapid friction of the side surfaces a and b leads to a deterioration in the quality of the machined surface and / or to the size going beyond the tolerance limit; b,c - the formation of cracks that reduce the quality of the machined surface and create a risk of chipping the cutting edge.	The cutting speed is too high or the friction resistance is not enough. Chemical (oxidation) in the effect of friction;
Formation of holes (pores) on the cutting surfaces due to friction		
 	Intensive crater formation, which leads to weakening of the cutting part. In the event that the auxiliary cutting edge can be destroyed, the cleanliness of the machining will deteriorate.	Increased diffusion friction due to excessively high temperatures on the front face.
Plastic deformation		

 	Plastic deformation: a - lowering of the edge; b - deepening of the side surface, leads to poor plate formation and a decrease in machining cleanliness. It increases the risk of serious corrosion of the side, which can lead to failure of the insert.	At high speeds and with very high temperatures in the cutting zone.
Tumor formation		
 	The buildup impairs the cleanliness of the machining and causes the cutting edge to chip during its operation.	The processed material sticks to the plate and forms a joint due to the following reasons: - low cutting speed, - negative rake angle on the cutting side.
The harm of cutting the bark		
 	Damage caused by chips falling on the unused part of the cutting edge. The upper and supporting surfaces of the insert may be damaged.	When falling, the chips hit the exit side.

Cutting surface chipping		
 	Cutting edge chipping leads to poor surface quality and excessive wear of the flanks.	The carbide grade of the insert is too brittle. The insert geometry does not provide sufficient strength.
Thermal cracks		
 	Small cracks perpendicular to the cutting edge will lead to its fragmentation and deterioration of the surface finish of the machined surface.	Thermal cracks are formed as a result of sudden changes in temperature: - interruption of the cutting process, - imbalance in the supply of cooling water.
Plate breakage		
 	An additional fault that can cause damage or breakage of the cutting plate and workpiece.	The alloy level is too brittle. The load on the cutting part has increased. The geometry of the plate does not provide enough strength. The size of the plate is not enough.
Ceramics transfer		
 	Increase cutting force	Choose a more durable brand of ceramic. Choose an insert with a smaller negative edge.

During wear, the mass of the cutting tool decreases, so the measure of wear can be mass. The wear of a cutting tool w measures the amount (mass) of material removed m in relation to the work A expended:

This method of measuring consumption is generally accurate, but it has a number of important drawbacks. The amount of pieces eaten relative to the total mass of the cutting tool is so small that it is difficult to measure. The following methods are used to determine the wear of cutting tools. Measuring the bending areas on the front and back surfaces. This is the most common method. This method is quite simple and reliable. For measurement, a magnifier and an instrumentation microscope are used. The wear areas are photographed on the ground with a photographic device. The depth of the groove on the front surface is measured with an indicator fixed to the column. This method allows you to compare the effect of the geometry of the cutting tool and the cutting speed on the wear over a period of time. Relative wear measurement to compare the deflection of cutting tools operating in different cutting processes, the ratio of the deflection to the path length of the cutter gives the relative deflection: Often, the deflection is expressed as a value corresponding to 1000 m of cutting path and is determined by the following formula.

$$U_0 = \frac{1000u}{\ell}, \; {}^{м}\!/_{1000м} \; \{ {}^{мкм}\!/_{1000м} \} \qquad (1)$$

According to the formula U - bending of the cutter during operation m (μm), l - cutting path, m.

Conclusion

Calculating relative tilt only gives accurate results in a standard tilt environment. From the point of view of machining accuracy, the deflection measured from the cutting edge normal to the machined surface and called dimensional deflection is of great importance. To determine the magnitude of the dimensional deflection, two superimposed lines are drawn at some distance from the peak of the beam. The dimensional deflection is calculated as the difference between the distance from the peak of the beam to the line measured at the beginning of the experiment and after the experiment. To increase the accuracy of the measurement, a single reference base is selected.

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